

Science Collaborative CIU Meeting #1

November 30th 10 a.m. – 3 p.m.

Present

KBRR Staff: Megan Murphy, Angie Doroff, Steve Baird, Kim Cooney, Amy Alderfer, Jess Ryan, Carmen Field
DNR: Rick Thompson (Regional Land Manager)

City of Homer: Bryan Hawkins (Harbormaster), Jim Hornaday (Mayor), Walt Wrede (Manager), Rick Abude (Planner)

KP Borough: Gary Steven (Kenai River Center), Susan Wilcox (Chief of Staff)

UAF: Jeff Freymeuller (Geophysical Institute Lab Mgr)

NOAA: Kris Holderied (Kasitsna Bay Lab Manager)

KBRR Community Council: Bob Hartley, Jim Hornaday, Rick Thompson

Seldovia Village Tribe: Tracie Merrill (for Michael Opheim)

Welcome & Introductions

Background (Angie – PowerPoint)

Walt said the Army Corps of Engineers noticed that the inner harbor bottom has gone up 1' already in just 5 years. For the City this means additional dredging and the need for policy that allows for dredge spoils to be used off the Spit (i.e., potential revenue source).

Collaborative Learning (Megan – PowerPoint)

1. Objectives, products, activities in proposal
2. Utilizing the collaborative process to communicate findings
3. Objectives, products, activities articulated along the way

Collaborative learning is 50% of what the Science Collaborative is about and will, in part, measure the project's effectiveness. While the linear approach of having one person make decisions may solve problems more efficiently, collaborative learning ensures that each voice is heard in a solution-oriented group decision process. This unique aspect of the Science Collaborative provides an opportunity for community outreach and involvement rather than just gathering data and submitting a final report.

Collaborative learning focuses on improving a situation rather than solving a problem. Realistically, not all problems can be solved; some can only be improved. Learning what we can from each other helps us decide where to place resources to affect the best outcome.

Perspective matters when deciding if a problem exists, and on how to improve and implement it. For example, "Ecosystem-based management" is a recognizable term, but how often do we treat management issues this way? Decisions depend on goals and perspectives. A lot has to be done before constructive implementation can occur.

6 principles of collaborative learning

1. Process – fair, transparent, honest; emphasis on systems thinking, mutual learning approaches
2. Relationship – all agencies in the process are equal partners
3. Communication – straightforward, honest, appropriate, respectful, sincere
4. Inclusion – diverse perspectives are represented
5. Participation – the whole is greater than the sum of the parts (most important, commitment to participate). What we get out of these meetings is as good as we make it.

6. Facilitated – notes, quarterly meetings, framework and techniques for process

There was a comment about geologic time vs. the length of study (3 years). Response: Once the initial study wraps-up, a framework will be in place for continued studies.

Discussion

Process

- Quarterly meetings – Is this commitment over the next 3 years a problem for anyone? Alternates or replacements may need to be considered over the course of the study. Keep things in electronic records for reference (website).
- Ideally – quarterly meetings are in-person, but probably not realistic; materials will be on the web, today's meeting is probably the longest; keep to agenda; process to substitute important subjects if not on the agenda. Look at timeline in packet – plan out first year for draft dates at end of today's meeting. Idea to piggyback onto quarterly Council meetings.
- Quarterly meetings are also a time to clarify points that may have been misinterpreted or misunderstood.
- Can we create a venue for public comment on the collaborative learning process? Megan will look into the ability to take comments on www.kbayrr.org
- Public meetings in Seldovia are best since internet service is very touch and go. Just posting to the website won't reach most Seldovia residents, City of Seldovia, SERVs, etc.
- Bear in mind that everyone around the table is not a scientist. This is the collaborative process. We discuss, tell what we know, share what we need, and work together to understand. What exactly will the process entail? Email, phonecall, etc? Whatever works best for the individual CIU – not necessarily the same method for everyone.

Communication

- We all speak in the English language: Should we define terms used in our discussions for the public?
- We all use an electronic language: Should we standardize the form of electronic communication amongst CIUs?
- Have the Homer Tribune put out a request for public input, or hold a CTP workshop.
- Email to the City Mgr and Borough Chief are all subject to public broadcast. Avoid chit-chat. It could appear in the Homer Tribune!
- Email – Does this work for everyone?
- Slides – Do you prefer to have slides printed for notes, or not (for resource savings)?

Inclusion

- Are there CIU not at today's meeting that should be included? Corps of Engineers, English Bay Corporation, Port Graham
- What about other user groups (besides CIU)? Ex: oyster growers, fishermen, private property owners, etc. How are they going to be involved?
 - This is a good idea, but what is the best way to communicate with them? Part of the goal of this discussion is to ID other users. Letter of Commitment for all CIUs to sign said they had to be employed in their jobs. KBRR agrees that there are many potential users, not just CIU.
 - Have a button on website that makes is really easy to click on and comment!
 - Concern over 'dinggy' people taking over the project in Homer. Not everyone is honest or forthcoming with data. Who makes the final decisions on what the final product is? This is why we're meeting quarterly to look over data being collected. We will summarize often and discuss data. We are open to what is the most useful form of the results for people.

There needs to be a healthy discussion of the data. We can't change what they are, but we will interpret it. Angie is the Principle Investigator, so she is responsible for the final "decision" about how the data is interpreted and presented.

- There are opportunities in the grant for different ways of outreach – there is flexibility to bring other ideas in for outreach, to meet another information need. We can't do a different study, but we can improve how to meet information needs.
- Science is "slow" – We're building on an existing study by Jeff. Interim reporting may not be that exciting, but baseline reporting will be useful to everyone involved. We will estimate what the land is doing based on interim reports in order to draw our final conclusion. That's not up for vote. The data will give us an idea of what is going on.

Participation

- What do CIUs need from the final report? What are we trying to understand? (See matrix) – List 10 things you want to get out of this project at the end of today's meeting. Needs are diverse. Interpretations and uses will differ. That is the goal for the close of the study, but we have to keep meeting and discussing for this to be successful.
- We would like participation by CIUs in other KBRR outreach events
- Complicated legal issues will likely be part of this discussion (tidelands, for example) – this could become controversial. Part of the goal of having different agencies involved is to make sure they're in the loop and confident with the data. It has to be legally defensible. We may not all be involved in policy decisions, so it's difficult for those who aren't policy makers to be open in discussions with policy-makers in the room.
- Paradise Lost situation
- Idea that the data can be interpreted in a variety of ways – everyone present around the table will be involved in the process, and everyone has different needs.
- What we're here for today is to determine how the end results can best be used by each individual agency. Example: coastal erosion study. One way to reduce legal issues is to be up front about our level of uncertainty.
- You will never reach all of the public, but you do your best to outreach the data. If you're engaged in the process and trust your end product as being science-based, then you can tell others about it.
- Scientific community may also wish to provide input as more information is outreached.
 - CIU are the ones who are primarily involved in the process by definition of the proposal
 - Discovery Labs will be used (grant)
 - Yearly progress reports will be put in the paper (grant)

Facilitated

- Notes are being taken for people to read and respond to later.

Lunch

Intro to Design of the Study (Angie)

The three presentations today are about the methods and tools that will be used in the field to begin answering questions outlined in the proposal. Megan's presentation also listed some of the objectives.

Landscape and sea level rise models (Jeff Freymueller – PowerPoint)

Jeff has worked at UAF since 1995 measuring motion and active processes of the earth. Take home messages:

- Relative sea level—the level of the sea relative to the land—is what matters to people
 - In Alaska, land level is changing faster than sea level
 - RSL = level of sea - level of land

- Sea level is affected by: thermal expansion, more water, gravity field, oceanography
- Land level is affected by: tectonics, post-glacial rebound, changes in water/ice loading, compaction of sediments, etc.
- We can measure these motions precisely
- We need to extend models that explain horizontal motions
- We know the main causes of the motions
- Can we predict motions decades into the future?

According to the Intergovernmental Panel on Climate Change (IPCC), the predicted sea level rise by 2100 is 30cm (~1'). However, current sea level rise is already at the upper range of IPCC's prediction, so sea level will definitely be higher, but how much higher?

Another prediction in the model show a rise of 80cm by 2100, but curves are hard to project into the future. The steeper curve toward the end of the century indicates an increased rate of sea level rise.

Prince William Sound shows subsidence of the land in mm/year. Kachemak Bay land is uplifting at approximately 3cm or 1.5" every two years.

Methods = GPS, very precise (within a few mm), measures vertical motion

- Site #1 Seldovia – uplift rate 10.9 mm/yr (continuous collection of data since 2001)
- Site #2 Homer Airport – uplift rate 8.6 mm/yr (infrequent collection from 1997)

Kenai Peninsula uplift rates thru 1997/98

- Determining the level of uncertainty of vertical motion is difficult since RSL requires knowing precisely where the center of the earth is. By contrast, knowing the location of Seldovia relative to Homer (horizontal motion) is not dependent on the center of the earth. Jeff needs to know the study objectives.

Main causes of uplift locally

Glacial isostatic adjustment – See PowerPoint

- Time delayed (viscous) lift of land caused by removal of ice load
- Instant (elastic) lift of land

Post-glacial rebound (melting ice)

- In SE AK some glaciers are losing more than 10' ice/yr – measured by flyovers (altimetry); ex: Yakutat icefields have lost their source of ice so they are merely wasting away
 - Winter – snowfall
 - Above some line, more snowfall than melting; below that line, more melting and less snowfall.
 - In Yakutat, area where glacier would be in "accumulation zone" is above where the current glacier is now. The glacier has melted down so low that it no longer accumulates ice from snowfall.
- Purpose is to measure melting of ice, but also transport of water – where does it go?
- General trend of ice/snow mass is going down in SE AK
- A small change in land uplift can greatly affect how fast glaciers melt at the toe – ice melts when it touches seawater, but Jeff doesn't know how much water is cooled

Uplift rates in SE AK (land) – GPS and GRACE

- 20mm ~ 1/4"/yr (???) is the highest rate
- Gustavus = 17mm/yr = 2/3"/year
- Altimetry data based on ice mass
- Current observations are ~ 10mm/year, half of which is from isostatic adjustment (not sea level)

- Tectonics effect (earthquakes) – the subduction zone along the Gulf of Alaska is where the Pacific plate is moving under North American plate
- The 1964 Alaskan earthquake was the 2nd largest ever recorded (slightly bigger than the one in Sumatra six years ago)
 - 50-60' movement of some areas toward the sea, so now everything is being pressed back, landward
 - Uplift occurred in the Gulf of Alaska, subsidence on Kenai Peninsula, with maximum subsidence in Cook Inlet
 - Post-earthquake, the opposite motion occurred – cyclic pattern; not sure if the earth comes exactly back to original level over time, but pretty close
 - Kachemak Bay was near the axis of maximum subsidence (~ 1m) and had significant subsidence in 1964; now uplift is occurring (data for 1964 and 1990s)
 - Max. uplift = 1.2 meters (4.5') since 1964 in Kbay
 - 60cm in Kbay = approx. 2'
 - It's possible that the Homer Spit subsided more than the land in 1964
 - Vertical and horizontal motions are different before/after an earthquake – it could be a few decades before it goes back to where it was initially; rates differ
 - Prediction into the future depends on how accurate measurements are, and how steady the change is
 - Post-glacial rebound doesn't affect horizontal motions, mostly vertical

Knowns/Unknowns:

- Can we measure and/or predict vertical motions precisely?
 - If so, how far into the future?
 - How well do current models which explain horizontal observations well, explain vertical observations, or is something missing?
- Bedrock vs. soft sediments
 - How fast do soft sediments compact?
 - How do silt-rich tidal flats compare to "old" sediments in town?

Goals:

- Measure vertical motions more precisely in Kachemak Bay (i.e., is Spit uplifting at the same rate as the airport?)
 - Are measurements precise enough for useful RSL predictions?
 - Verify that uplift rates are not uniform in the region
 - Measurements must be precise enough to be useful to stakeholders. Older sites will get a more precise measurement, newer sites will only have 3 yrs of data. Time is the ally – 5 years from now, more will be known.
 - Head of the bay rates are slower than at head of the bay – is this accurate?
- Extend models that work for horizontal motions to explain vertical motions
- Project future RSL locally
- Combine with response of ecosystems

Data from all of Jeff's sites is currently available via FTP from UAF.

Discussion

Variables affecting RSL include specific gravity and land level rise, but what about sea floor rise? The sea floor is affected the same as the land, keeping in mind sediment composition of the sea floor. Ocean water weight on the sea floor affects sea floor level, but the change is relative, taking water weight into account. Soft sediments move and compact, affecting sea floor levels more than water weight, which is more constant.

A difference of 30' was measured in Kachemak Bay within one year due to sediment transport.

GRAV-D (Gravity for the Redefinition of the American Vertical Datum) is a program used to measure vertical motion of the earth's surface from an airplane using a grid pattern. Prior to this program, very little was known about the gravity field in Alaska. You need accurate gravity field data in order to measure vertical motion.

Loss of glacier mass has increased significantly in last 10 years. Glaciers everywhere are melting, and they're melting faster now than ever before in history. Hubbard Glacier is extending toward the ocean, but not gaining mass.

Land and sea-level rise in KBRR salt marsh habitats by vegetation and sediment accretion monitoring (Steve Baird/Angie Doroff – PowerPoint)

Saltmarshes are highly productive habitats that support a variety of plant and animal species. Distribution of saltmarsh plants is driven by their tolerance to saltwater. Since saltmarshes are affected by sea level depending on their angle to the ocean, small changes in sea level could affect large areas of saltmarsh. Differences in saltmarshes may not be the same as in bedrock sites due to compaction of soft sediments in saltmarshes.

The significance of sea level rise in relation to the extreme tidal range in Kachemak Bay depends on where non-salt tolerant species reside now. Those species on the close edge of the salt/fresh line could be inundated with a small rise in sea level, and would not have time to adapt as they have to the extreme tides.

The Science Collaborative will measure vertical control, temperature, salinity and inundation of four saltmarshes in Kachemak Bay, and assess changes in vegetation, sedimentation, accretion, and erosion. Results should help explain the balance between uplift, erosion and sedimentation/accretion, and show if plants shift seaward in response to marsh surface rise (i.e., uplift).

Break

Biological diversity in salt marsh habitats relative to glacier melt water input (Angie Doroff/Steve Baird – PowerPoint)

Part of the purpose of today's meeting is to review project expectations, gaps in understanding, and the working process as a group. If you have ideas about how to learn more about the subjects discussed today (seminar, CTP workshop, special meetings, etc.), please let Megan know so these can be incorporated into the collaborative process.

Discussion

Is colder water better for the animals? Part of what happens with fresh water transport from glacier melt is that a warmer surface current is created when glacial silt is transported. However, forage fish like cold water to buildup fat, so warmer waters harm those species and ones who depend on them for food. It's a complex answer to complex system. Some species will do better with cold water while others do better with warm. Dramatic changes are happening now, and more are on the way.

Is anecdotal information useful? It can be, but it's hard to integrate into scientific data. It could be as easy as recognizing the need to obtain data from a particular area. Having a website where people could submit input could be useful in this way. For example, the Alaska Earthquake Information Center website has a 'Did you feel it?' link to a survey. If enough people respond, results are as expected in terms of the location of an earthquake relative to where people live.

Odds & Ends

- Megan's comrade has used the collaborative learning process in Maine. She can email you if interested.

- 12/7th – ACCAP talk webinar given by Jeff Freymeuller, hosted at KBRR. Topic: regional variations of sea level.
- February – ‘Landscapes Over Time’ Discovery Lab. CIUs are encouraged to attend and/or participate. Megan will email a reminder.

Additional Items

1. Future meeting dates: Coordinate quarterly KBRR Community Council meetings and quarterly Science Collaborative meetings (see calendar in back of binder)? The group will shoot for a date near the March Council meeting (3/16th). Megan will send a reminder 1-2 months ahead.
2. Front end understanding: Write-down one thing related to the Science Collaborative study that you did not know before today to help fill-in the matrix. Existing Xs in the matrix were taken from CIUs Letters of Commitment.

A request was made to change the wording for Kenai Peninsula Borough to ‘...inform planning and zoning as data becomes available.’ This is an awareness factor vs. decision-making.

A request was made to add wording for the City regarding ‘best management practices’ (i.e., for seawall-type projects), and to add an X under ‘natural hazard areas.’

A request was made to add an X for NOAA under ‘Increased understanding...’

A request was made to confirm with Michael Opheim on adding an X under ‘Increased understanding...’ for the Seldovia Village Tribe.

Adjourned

The meeting adjourned at 2:50 p.m.